

Remarks

For the Specification:

Applicant amends the specification to correct an error in the use of defined terminology. In the paragraph beginning on page 8, line 13, the terms "length," "width," and "height" are defined. "Length" is solely longitudinal (i.e., along the road), "width" is solely transverse and perpendicular to "length" (i.e., across the road), and "height" is solely perpendicular to both "length" and "width" (i.e., into the road).

In the paragraph beginning on page 12, line 17, "widths" was inadvertently used to indicate longitudinal dimensions. This has been corrected to "lengths." This amendment adds no new subject matter.

For the Claims:

Applicant submitted claims 1-21. The Office Action rejects claims 1-21. Applicant cancels claims 5-6, amends claims 1, 7-11, 15, 18, and 21, and retains claims 2-4, 12-15, 16-17, and 19-20 as originally submitted. Applicant respectfully requests reconsideration.

Section 5 of the Office Action rejects claims 1-2, 5-7, 11-12, 15-16, 19-20 under 35 U.S.C. 102(b) as being anticipated by Wood et al., U.S. Patent No. 4,842,411 (hereinafter Wood).

Section 6 of the Office Action rejects claims 8-9 and 17-18 under 35 U.S.C. 103(a) as being unpatentable over Wood.

Section 7 of the Office Action rejects claims 3-4, 10, 13-14, and 21 under 35 U.S.C. 103(a) as being unpatentable over Wood in view of Fukuhara et al., U.S. Patent No. 4,653,316 (hereinafter Fukuhara).

In regard to claims 5 and 6 (cancelled herein), the Office Action asserts that Wood teaches correlating an image signal with a reference signal, and configuring the reference signal to correspond to the projected pattern, and cites column 4, lines 6-31.

Wood teaches the use of digital photogrammetry to determine the shape of an object. Photogrammetry is the comparison of two images of the same plane at different angles in order to determine data substantially perpendicular to that plane. In other words, Wood uses two images of the object on an X-Y reference plane (the conveyor belt) to determine the contour of the object in the Z dimension. The images are taken at different angles to the reference plane, and therefore contain different details about the object.

It is important to the Wood methodology that the object be illuminated by a projected pattern substantially perpendicular to the reference plane (see FIG. 1). The first image of the illuminated object is captured at a first angle by a first camera (lens 3, CCD array 4, and digitizer 21), and the second image is captured at a second angle by a second camera (lens 6, CCD array 7, and digitizer 22). The two images are then passed to parallax processor 23 where phase differences between the images are used to produce data in the Z dimension.

Nowhere in the Wood methodology is a reference signal of any form used or required. That is, parallax processor 23 neither

knows nor needs to know what kind of pattern is projected to illuminate the object. Therefore, the assertion that Wood teaches the correlation of an image with a reference signal (asserted for claim 5) is erroneous, as Wood uses no reference signal.

Furthermore, the reference signal claimed by applicant corresponds to the projected pattern (claim 6). To equate one of the images capture by Wood with a reference signal and assert that that reference signal corresponds to the projected pattern (asserted for claim 6) is also erroneous. Each of the images captured by Wood was captured at an angle relative to the projected pattern, and therefore contains distortions of the projected pattern. That is, neither captured image corresponds to the projected pattern, but only to a reflection of the projected pattern as viewed at an angle and distorted in the Z dimension by the presence of the object.

Claims 5 and 6, as originally submitted, should have been allowable over Wood. However, for reasons discussed hereinafter in conjunction with independent claims 1, 11, and 21, applicant has canceled claims 5 and 6.

In regard to independent claims 1, 11, and 21, the Office Action asserts that Wood teaches projecting a two dimensional pattern of alternating relatively lighter and darker regions of varying widths upon a surface at a first angle, capturing an image of the pattern from a second angle, and processing the image to produce a profile of the surface.

Applicant has amended independent claims 1, 11, and 21 to correct the "width" versus "length" inconsistency described hereinbefore in conjunction with the specification.

Applicant has further amended independent claims 1, 11, and 21 to include the limitations of now-cancelled claims 5 and 6 regarding the use of a reference signal corresponding to the projected pattern.

Wood does not teach what is claimed by applicant in independent claims 1, 11, and 21. As discussed hereinbefore in conjunction with claims 5 and 6, Wood neither uses nor needs a reference signal. And, since Wood teaches digital photogrammetry, Wood teaches away from the use of a reference signal as claimed in independent claims 1, 11, and 21. To modify Wood so as to use a reference signal would thwart the dual reception-image photogrammetry technique taught by Wood and not benefit Wood in any manner. There is no suggestion of such a modification in Wood or the other prior art of record, so it would not be obvious to one of ordinary skill in the art to so modify Wood.

Applicant believes independent claims 1, 11, and 21, as currently amended, to be allowable over Wood. Applicant respectfully requests reconsideration of independent claims 1, 11, and 21.

In regard to claim 2, the Office Action asserts that Wood teaches discrete multiple ones of the patterns, and makes reference to column 3, line 6, as an example of periodic patterns.

Column 3, lines 2-8, of Wood (i.e., the whole of the sentence encompassing the cited line 6) states:

The "grating" comprising "bands" of low light portions 16 interleaved with high light intensity "bands" 17 along the X

direction, represented by line 18; the resulting "grating" has a periodic, smoothly varying light intensity pattern across the surface of object 1, and in the direction indicated by arrow 18.

Wood clearly states that it is the "bands" in the light intensity pattern that are periodic, not the pattern itself. That is, Wood projects a single continuous pattern that is periodic in its lighter and darker regions.

Wood therefore does not teach and explicitly teaches away from "discrete multiple ones of said patterns" as claimed by applicant in claim 2. Furthermore, there would be no advantage in the system of Wood to use discrete multiple patterns. It would not be obvious to one skilled in the art to modify Wood where there is no advantage to the modification.

Applicant believes claim 2, as originally submitted, to be allowable over Wood. Additionally, claim 2 depends directly from independent claim 1, now believed to be allowable for the reasons discussed hereinbefore. Claim 2 is therefore believed to be allowable by reason of dependency. Applicant respectfully requests reconsideration of claim 2.

In regard to claim 7, 8, 9, and 10, the Office Action asserts that Wood teaches correlating the image signal with a reference signal.

As discussed hereinbefore in conjunction with claims 5 and 6, Wood neither uses nor needs a reference signal, but discloses a photogrammetry technique that teaches away from such a reference signal. To modify Wood so as to use a reference signal would not benefit Wood in any manner. Since there is no suggestion of such a modification, it would not be obvious to one of ordinary skill

in the art to so modify Wood. Wood does not teach what is claimed by applicant in claims 7, 8, 9, and 10.

Applicant has amended claims 7, 8, 9, and 10 to reflect the amendments made to independent claim 1, and to correct a minor grammatical and/or typographical error in claim 9.

Applicant believes claims 7, 8, 9, and 10, as currently amended, to be allowable over Wood. Additionally, claims 7, 8, 9, and 10 each depend directly from independent claim 1, now believed to be allowable for the reasons discussed hereinbefore. Claims 7, 8, 9, and 10 are therefore believed to be allowable by reason of dependency. Applicant respectfully requests reconsideration of claims 7, 8, 9, and 10.

In regard to claim 16, the Office Action asserts that Wood teaches projecting the pattern with a predetermined monochromaticity, and filtering the camera to be sensitive to that monochromaticity. The Office Action further suggests that the CCD sensors must be filtered to operate properly.

Nowhere in Wood is there any suggestion of monochromaticity. The use of CCD sensors does not and cannot infer a requirement of filtration and/or a requirement for monochromaticity in that CCD sensors are not inherently monochromatic (witness the plethora of digital cameras available worldwide, which cameras are most definitely **not** monochromatic).

To make Wood function monochromatically would necessitate the use of filtration and/or lasers, and would markedly increase the complexity and cost of Wood without substantial benefit. Conversely, Wood has striven throughout to maintain simplicity.

Wood, therefore, teaches away from any untoward increase in complexity.

Lacking any suggestion in Wood, the assertion of monochromaticity appears to have been made in hindsight by reading the present invention into Wood. This is not permitted.

Also, since the effecting of monochromaticity in Wood would involve modifications that add nothing to Wood but increase the cost of the Wood system, it would not be obvious to one of ordinary skill in the art to make such modifications.

Applicant believes claim 16, as originally submitted, to be allowable over Wood. Additionally, claim 16 depends directly from independent claim 11, now believed to be allowable for the reasons discussed hereinbefore. Claim 16 is therefore believed to be allowable by reason of dependency. Applicant respectfully requests reconsideration of claim 16.

In regard to claim 17, the Office Action asserts that, while Wood does not explicitly teach the use of a laser, it is a matter of design choice as to whether or not a laser is used as the projection light source, and that the use of a laser would produce the predetermined monochromaticity.

The choice of a laser as a light source is not simply a design choice. A laser, besides being monochromatic, is also highly collimated. The use of a collimated beam of light would require the use of either a scanning mechanism or a beam spreader, neither of which is suggested in Wood. To use a laser with Wood would require extensive modifications that are not suggested, would not increase Wood's ability to fulfill its functions, and would significantly increase complexity and cost.

One skilled in the art would not find it obvious to make such modifications.

In the present invention, a laser is used so that the monochromatic and coherent light generated thereby may be readily distinguished from bright background illumination, even in broad daylight. Bright background illumination, such as occurs in broad daylight, is not a problem for Wood.

Wood is intended for operation in a controlled environment and does not have the problem of bright background illumination. The use of a laser with Wood would add complexity and cost not warranted by the intended function. Therefore, the assertion that a laser is a suitable light source for Wood appears to have been made by reading the present application into Wood. This is hindsight, and is not allowed.

Applicant believes claim 17, as originally submitted, to be allowable over Wood. Additionally, claim 17 depends from independent claim 11 through claim 16, both now believed to be allowable for the reasons discussed hereinbefore. Claim 17 is therefore believed to be allowable by reason of dependency. Applicant respectfully requests reconsideration of claim 17.

In regard to claim 18, the Office Action asserts that the use of a stroboscopic projector is simply a design choice.

The use of a stroboscopic projector is not simply a design choice. In the present invention, the use of a stroboscopic projector provides an alternative means of providing a pattern readily distinguishable in broad daylight.

As mentioned hereinbefore, Wood is intended for operation in a controlled environment and does not have the problem of bright background illumination. The use of a stroboscopic projector would add unwarranted complexity and cost. Therefore, the assertion that a stroboscopic projector is a suitable light source for Wood appears to have been made by reading the present application into Wood. This is hindsight, and is not allowed.

As originally submitted, claim 18 depended from independent claim 11 through claim 16. Claim 16 added an unnecessary limitation of monochromaticity to claim 18. Therefore, applicant has amended claim 18 to depend directly from independent claim 11.

Applicant believes claim 18, as currently amended submitted, to be allowable over Wood. Additionally, claim 18 depends directly from independent claim 11, now believed to be allowable for the reasons discussed hereinbefore. Claim 18 is therefore believed to be allowable by reason of dependency. Applicant respectfully requests reconsideration of claim 18.

In regard to claims 3-4, 12-15, and 19-20, claims 3-4 depend from independent claim 1, and claims 12-15 and 19-20 depend from independent claim 11. Inasmuch as independent claims 1 and 11 are now believed to be allowable for the reasons discussed hereinbefore, claims 3-4, 12-15, and 19-20 are therefore believed to be allowable by reason of dependency. Applicant respectfully requests reconsideration of claims 3-4, 12-15, and 19-20.

Accordingly, this Amendment cancels claims 5-6, and amends claims 1, 7-11, 18, and 21. Currently amended amends claims 1, 7-11, 15, 18, and 21 remain in the application and are believed to be allowable. In addition, claims 2-4, 12-15, 16-17, and 19-

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20 remain in the application as originally submitted and are believed to be allowable.

Applicant believes that the foregoing amendments and remarks are fully responsive to the rejections and/or objections recited in the 13 January 2005 Office Action and that the present application is now in a condition for allowance. Accordingly, reconsideration of the present application is respectfully requested.

Respectfully submitted,

A handwritten signature in black ink, reading "Lowell W. Gresham", with a horizontal line underneath.

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